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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,873	06/27/2005	Noriya Izu	274380US0PCT	1755
22850 7590 12/28/2009 OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, L.L.P. 1940 DUKE STREET ALEXANDRIA, VA 22314				
EXAMINER ZHAO, XIAO SI				
ART UNIT 1792		PAPER NUMBER		
NOTIFICATION DATE 12/28/2009		DELIVERY MODE ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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# Office Action Summary

**Application No.**

10/540,873

**Applicant(s)**

IZU ET AL.

**Examiner**

XIAO ZHAO

**Art Unit**

1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 November 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) 8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/CD)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/10/2009 has been entered.

### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-7 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim 1 recite the amended limitation of "wherein the particles have necks produced between the particles thereby forming a porous body which is electrically conductive". This limitation appears before the limitation of "sintering the calcined substrate". However, Applicants' specification discloses that the necks that are produced between the particles are a result of sintering (page 11, lines

10-12). The specification does not provide any disclosure that supports forming necks between particles prior to sintering. Appropriate correction or clarification is required. For the purpose of examination, Examiner assumes and modifies the limitation to be "sintering the calcined substrate wherein the particles have necks produced between the particles thereby forming a porous body which is electrically conductive".

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. **Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kimura et al. (US 5945369) in view of Hata et al. (US 6068828), Utter et al. (US 5819652) and Ishikawa et al. (US 6521671).**

*Per independent claim 1:*

Kimura et al. teach a catalyst for purifying exhaust gases which includes a porous support; a cerium oxide or a solid solution of a cerium oxide and a zirconium oxide which is loaded on the porous support, the cerium oxide or the solid solution has an average particle diameter of from 5 to 100 nm (see abstract). The solid solution can also be a combination of cerium oxide and a zirconium oxide (see col. 3, 10-12). The raw material cerium oxide powder goes through a heat treatment in reducing atmosphere (col. 8, 67 to col. 9, 2). The heat treatment is in a temperature range of from 300 to 1200 °C. It is advantage to carry this heat treatment since crystalline particles of the cerium oxide release oxygen to cause oxygen deficiency therein; it is believed that the presence of oxygen deficiency further promotes the solid solution of the zirconium oxide in the cerium oxide (col. 9, 10-16). When the heat treatment is carried out, the particles of the raw material powders may grow granularly or sinter each other (col. 9, 18-19). From the first preferred embodiment, the cerium oxide is in an amount of 30% by weight and has an average particle diameter of 7 nm; after the whole process, the average particle diameter is 35 nm. The raw material powder can be dispersed in a dispersing medium such as ethanol (col. 10, 40-42). The slurry can be coated and calcined on a support substrate (col. 4, 48-52).

Kimura et al. fail to teach dispersing agglomerated particles in the solvent, removing the precipitate, evaporating off the solvent, mixing the resulting oxide with an organic binder to obtain a paste, printing the paste onto a substrate by screen printing followed by sintering.

Hata et al. teach that zirconia is a main component that can be effectively used as sensor parts in; the zirconia is usually produced in the art in which a slurry containing zirconia powder, organic binder, and a solvent is formed into a sheet; the sheet is dried to evaporate the solvent; and then it is placed on a setter(substrate) and calcined to decompose or remove the organic binder and to sinter the ceramic powder (col. 1, 25-35). Furthermore Hata et al. disclose that the zirconia powder can contain cerium oxide as well (col. 6, 34-49).

Utter et al. teach that screen printing of conductive paste onto unfired ceramic substrates or sheets is a well known technique in the art (col. 1, 13-15).

Ishikawa et al. teach that an ultrasonic homogenizer was used to disperse particles in a mixture (col. 13, 64-66).

It would have been obvious to one of ordinary skill in the art to incorporate the method taught by Hata et al., Utter et al., and Ishikawa et al. to Kimura et al. One would have been motivated to do this because this is a combination of prior elements according to known method to yield predictable results. In addition, Kimura et al. disclose that the cerium oxide powder can be dispersed in any desired manner into the solvent (col. 10, 45-47) thus it would have been obvious to use a ultrasonic homogenizer to disperse the particles into the solvent since this would result in well dispersed particles.

Kimura/Hata/Utter/Ishikawa does not specify that the porous thick film has an electrical conductivity of at least  $10^{-3}$  S/m at 800° C. However, since the combination of

references teach all the steps recited in the instant claim, the final porous thick film that is formed must also have an electrical conductivity of at least  $10^{-3}$  S/m at 800° C.

Kimura/Hata/Utter/Ishikawa does not specify that the particles have necks produced between the particles. However, since Kimura/Hata/Utter/Ishikawa teach sintering after calcining, it is inherent that necks would also be produced between the particles as a result of sintering.

Per claims 2-5, Kimura et al. did not disclose that the raw material powder is at least 10 nm but less than 45 nm; the heat treatment occurs at 880 to 920 °C after the heat treatment and that the powder is at least 45 nm after the heat treatment. However it would have been obvious to one of ordinary skill in the art that controlling the particle diameter of cerium oxide is important since Kimura et al. disclose (col. 2, 7-15) that a cerium powder that has too large of a diameter cannot keep exhaust gases in predetermined atmosphere by storing oxygen in and releasing oxygen from the cerium oxide. Thus, manipulating the diameter of the raw material, temperature of the heat treatment (which would determine the diameter of the powder after the treatment) would have been be obvious one of ordinary skill in the art at the time of the invention to achieve a desirable final particle diameter suitable for the application to a substrate.

Per claims 6-7, Kimura et al. teach that the proportion by weight of the oxide is 10 to 30 wt% and that cerium oxide and zirconium oxide particles are used (col. 12, 16-26).

***Response to Arguments***

7. Applicant's arguments filed 9/14/2009 have been fully considered but they are not persuasive.

a. Applicants argue, on page 5 of arguments, that the Office has not met its burden of proof with respect to inherency regarding electrical conductivity. This is not persuasive because as explained above, the combination of references teach each and every step recited in claim 1, and therefore the resulting product would also have an electrical conductivity as instantly claimed.

b. Applicants further argue that the alumina powder taught by Kimura are porous supports and therefore **no** electrical conductivity would exist between the oxide particles and no necks would be formed between the particles. This is not persuasive because since the combination of references teaches sintering the oxide particles, the necks would also inherently be formed between the oxide particles. In addition, Applicants' assertion that no electrical conductivity would be formed due to the presence of alumina powder is unsubstantiated. No factual evidence has been provided by Applicants to support such argument.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to XIAO ZHAO whose telephone number is (571)270-5343. The examiner can normally be reached on Monday to Friday 8:30 am EST to 5:00 pm EST.



If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Kornakov can be reached on (571)272-1303. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Supervisory Patent Examiner, Art  
Unit 1792

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Examiner, Art Unit 1792

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